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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/814,177 | 04/01/2004 | Mitsutoshi Nakajima | 251393US2X | 7393 |
| 22850 | 7590 | 11/14/2006 | | |
| C. IRVIN MCCLELLAND OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER DRODGE, JOSEPH W | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1723 | |

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/814,177

Applicant(s)

NAKAJIMA ET AL.

Examiner

Joseph W. Drodge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 6-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 10 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 6-9 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>0804</u> . | 6) <input type="checkbox"/> Other: _____ |

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Applicant's election with traverse of Species IV in the reply filed on 10/10/2006 is acknowledged. The traversal is on the ground(s) that the instant claims are all part of an overlapping search area and search of the entire application would not constitute a serious burden on the Examiner. This is not found persuasive because the non-elected Species each concern mutually exclusive and diverse technologies, requiring searches in respective different classes.

The requirement is still deemed proper and is therefore made FINAL.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5, 10 and 11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. in view of 6,258,858 or claims 1-14 of U.S. Patent 6,281,254 in view of Brophy et al patent 7,118,920. The instant claims differ from various independent and dependent claims of

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'858 and '254 primarily in requiring the microchannel substrate to be "resin" and in the dimensions of the microchannel height, width and ratio thereof. However, Brophy (column 11, line 42-column 12, line 4, in particular column 11, lines 61-64) teaches that it is well known to make microchannel materials of resin material, since these are amenable to being engineered to tight tolerances and different degrees of hydrophobicity or hydrophilicity can be imparted and in column 3, lines 21-38 to use resin bonding so as to hold the different layers of the structure together.

As to the dimensions, the claimed range of microchannel height and width and ratio's are so broad as to not constitute significant limitations, since the dimensions cited in the instant claims are inherent in claim terms "microchannel".

Claims 1-5, 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Within independent claim 1, the preamble "resin microchannel substrate" renders all the claims vague and indefinite or incomplete, since it is unclear whether applicant is claiming one or more of the components of the substrate (recess, surface, microgrooves, flat plate etc.) being of resin material, and/or is claiming use of resin to bond components together such as surface to flat plate.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1,2,4,5,10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al patent 6,258,858 in view of Brophy et al patent 7,118,920. Nakajima '858 discloses a microchannel apparatus comprising a substrate surface 3 having recess 4 extending from supply port 18 or 19, having a raised bank 21 adjacent the recess with plural microchannels 23 connecting from the recess to outside of the recess (figure 7). The width and height of the microchannels and ratio thereof are all within the claimed ranges (column 5, lines 39-42). The substrate surface is attached

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to a flat plate/cover 5 in a sealed arrangement such that liquid cannot escape (column 4, lines 60-62).

The claims all differ in requiring a component(s) or joining of components to each other to comprise resin. However, Brophy (column 11, line 42-column 12, line 4, in particular column 11, lines 61-64) teaches that it is well known to make microchannel materials of resin material, since these are amenable to being engineered to tight tolerances and different degrees of hydrophobicity or hydrophilicity can be imparted. It would have been obvious to one of ordinary skill in the art to have utilized resin materials for one or more of the '858 layers/surfaces, as taught by Brophy, to allow engineering to tight tolerances and impart desired degree of hydrophilicity and hydrophobicity for the particular materials being handled by the apparatus.

The claims also differ in requiring the substrate surface and flat cover plate to be attached in a firm manner. However, Brophy teaches in column 3, lines 21-38 to use resin bonding so as to hold the different layers of the structure together.

As to dependent claims, for claim 2, Brophy teaches in column line and column line to vary the contact angle of substrate surface relative to water or other fluid being handled as a degree of imparted hydrophobicity or hydrophilicity.

For claim 4, see structures 22 of '858 defining the microchannels which comprise raised surfaces.

For claim 5, Brophy teaches placing a plurality of substrates on top of each other in close contact, forming multiple microchannels in column 3, lines 23-38 so as to

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enable the apparatus to conduct multi-step processes or processes concerning mixing, combining of multiple phases/fluids.

For claims 10 and 11, '858 discloses sending a 1st fluid from inside of the recess, through the microchannels so as to be dispersed in a second fluid on the outside of the recess, without mixing (column 6, lines 15-34) and for claim 11, the cover plate being made of glass, hence transparent (column 4, line 61).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al patent 6,258,858 in view of Brophy et al patent 7,118,920 as applied to claim 1,2,4,5,10 and 11 above, and further in view of Gason et al PG PUBS Document US2005/0199500. Claim 3 further differs in explicitly requiring the surfaces/structures to include microchannels having an edge angle of 90 degrees or less. But, Gason et al teach in paragraph 153 a microchannel-containing structure with the channels having low edge angles, and teaching motivation to provide such low edge angles to minimize fluid inertia in movement of the fluids.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nakajima et al patent 6,177,479 and Howitz et al patent 5,730,187 are of general interest for structures with microchannels used in handling, forming and breaking emulsions.

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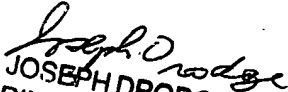
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Drodge at telephone number 571-272-1140. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda Walker, can be reached at 571-272-1151. The fax phone number for the examining group where this application is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either private PAIR or Public PAIR, and through Private PAIR only for unpublished applications. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have any questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JWD

October 26, 2006


JOSEPH DRODGE
PRIMARY EXAMINER